AMENDMENTS TO THE SPECIFICATION

Please amend page 1, in the title as follows:

METHOD OF MAKING A NANOSCALE ELECTRONIC COMPONENT COMPRISING PROGRAMMING WITH A SELF-ADAPTIVE ALGORITHM ~~PROGRAMMABLE MOLECULAR DEVICE~~

Please amend page 1, lines 3-17, in CROSS REFERENCE TO RELATED APPLICATIONS as follows:

This application claims the benefit of U.S. Provisional Applications Serial No. 60/220,790, filed July 25, 2000, Serial No. 60/223,644, filed August 8, 2000, Serial No. 60/224,080, filed August 8, 2000, and Serial No. 60/273,383, filed March 5, 2001. Further, the present application is a continuation-in-part of co-pending U.S. Utility Applications Serial No. 09/488,339, ~~Attorney Docket No. 17285-28,~~ entitled "Molecular Computer", filed January 20, 2000, now U.S. Patent No. 6,430,511 and which claims the benefit of U.S. Provisional Application Serial No. 60/116,714, filed January 21, 1999. Still, further, the present application is a continuation-in-part of co-pending U.S. Utility Application Serial No. 08/595,130, filed February 1, 1996, now U.S. Patent No. 6,320,200 which claims priority of U.S. Utility Application Serial No. 08/261,867, filed June 16, 1994, now abandoned, which in turn is a continuation-in-part of U.S. Utility Application 07/891,605, filed June 1, 1992, now abandoned. Yet further, the present application is a continuation-in-part of U.S. Patent Application Serial Number 09/551.716, ~~Attorney Docket Number OCR-1019~~, filed April 18, 2000, entitled

"Molecular Scale Electronic Devices", now abandoned, which claims the benefit of U.S. Provisional Applications Serial No. 60/154,716, filed September 20, 1999 and Serial No. 60/157,149, filed September 30, 1999 and U.S. Utility Application 09/527,885, filed March 30, 2000. Each of the above-listed Applications is hereby incorporated herein by reference.

Please replace paragraphs [0026] and [0027] with the following amended paragraphs:

[0026] Still referring to Figure 1, nanocell 12 preferably further includes at least one input lead 20 and at least one output lead 22. The numbers of input leads and of output leads are not crucial. The number of leads preferably is constrained only by me technique for forming leads 20, 22, such as conventional lithography, and by the size of nanocell 12 ~~20~~. Leads 20, 22 are shown at the edges of nanocell 12 in Figure 1. It will be understood that other configurations of leads are contemplated. For example input leads 23 and output leads 25 may be interleaved, extending from edges of nanocell 27, such as shown in Figure 2A. Alternatively, input leads 29 and output leads 33 may extend from concentric perimeters 37 defining the edges of nanocell 39, as shown in Figure 2B.

[0027] Nano-network 28 ~~20~~ preferably spans each input lead 20 and each output lead 22. Leads 20, 22 may be metallic and are designed to connect to conventional lithographic interconnect, such as metallic wire. Edge molecular circuit components 24 are connect to leads 20, 22, through molecular alligator clips 26 ~~31~~. Molecular alligator

clips include sticky end groups that bind to metal, based on moieties such as sulfur, oxygen, selenium, phosphorous, isonitrile, pyridine, and carboxylate. A particularly preferred sulfur-based molecular alligator clip is a thiol group. It will be understood that molecular circuit components 14 may include two, three, four, five, six or more termini, such as disclosed in Tour, J. M.; Kozaki, M.; and Seminario, J. M. "Molecular Scale Electronics: A Synthetic/Computational Approach to Digital Computing," J. Am. Chem. Soc. 120, 8486-8493 1998), which is incorporated by reference herein, and in U.S. Patent No. 6,259,277, hereby incorporated herein by reference. Each terminus is preferably an end that includes a molecular alligator clip.

Please replace paragraph [0032] with the following amended paragraph:

[0032] Still referring to Figure 1, molecular circuit elements 14 preferably include conjugated molecular segments. The conjugated molecular segments are preferably substituted with groups at the termini that function as molecular alligator clips. Exemplary conjugated molecules that serve as conjugated molecular segments for molecular circuit elements, and exemplary conjugated molecules functionalized with molecular alligator clips are described in: Tour, J. M. "Molecular Electronics. Synthesis and Testing of Components," Accounts of Chemical Research, volume 33, number 11, pages 791-804 (2000); Tour, J. M.; Kozaki, M.; and Seminario, J. M. "Molecular Scale Electronics: A Synthetic/Computational Approach to Digital Computing," J. Am. Chem. Soc. 120, 8486-8493 (1998); Dirk, S. M., et al. "Accoutrements of a molecular

computer: switches, memory components and alligator clips," Tetrahedron 57, pp. 5109-5121 (2001), each hereby incorporated herein by reference. Further, molecular circuit components 14 may include any of the molecules, conductive organic material, or conductive paths disclosed in U.S. Patent Application Serial Number 09/551.716, ~~Attorney Docket Number OCR. 1019~~, filed April 18, 2000, <u>now abandoned</u>, entitled "Molecular Scale Electronic Devices", which is incorporated by reference herein.

Please replace paragraph [0050] with the following amended paragraph:

[0050] Referring now to Figure 3, operation of a molecular switch is exemplified by operation of a molecule 34. When a switching voltage above 2.0V is applied to molecules 34, molecules 34 switch to the high conductivity state and when a corresponding voltage below -2.0V is applied the molecules 34 will switch to a low conductivity state. The switching voltage is preferably between about 0.2 and 3.0V for the high state and -0.2 and -3.0V for me low conductivity state. The high conductivity state is associated with the I(V) curve that is traced by black dots and the low conductivity state is associated with the lower I(V) curve, traced by white dots, in Figure 4. The degree of differentiation between the high and low conductivity states is determined by the difference between these two curves. When an operating voltage between about -2 V and 2V is applied to molecules ~~36~~ <u>34</u> they conduct according to the state, high or low conductivity, that they were most recently switched to. A molecule in die high conductivity state will also exhibit low conductivity if a voltage exceeding the

negative differential resistance (NDR) limit is applied. The degree of differentiation between high and low conductivity of a molecule in the high conductivity state that is due to the NDR effect is determined by the ratio between the peak and valley on the I(V) curve traced by me black dots. The absolute value of the operating voltage is preferably between about 0.2 and about 2.0V.

Please replace paragraph [0052] with the following amended paragraph:

[0052] It will be understood that the type of the self-adaptive algorithm is not critical. Any suitable conventional self-adaptive algorithm capable of training a network such as nano-network 28 may be used. Exemplary self-adaptive algorithms include genetic algorithms, simulated annealing algorithms, reinforcement~~reinforcement~~ learning algorithms, temporal~~temp eroral~~ difference algorithms, go with the winner algorithms, and the like. The principles of self-adaptive algorithms are described in Goldberg, D.E., Genetic algorithms in Search, Optimization, and Machine Learning, (Addison Wesley, Reading, MA, 1989), pp. 1-15 and 221-229, hereby incorporated herein by reference.

Please replace paragraph [0056] with the following amended paragraph:

[0056] In another preferred embodiment, device 10 is programmable to function as a logic unit selected from tile group consisting of an Adder, a Half-Adder, a Multiplexer, a Decoder, or and the like. Thus, in this embodiment, when device 10 has been

programmed, it is a programmed logic device with the logic element being selected from the group consisting of an Adder, a Half-adder, a Multiplexer, a Decoder, and the like. In yet another preferred embodiment, device 10 is programmable to function as a memory unit.

Please replace paragraph [0132] with the following amended paragraph:

[0132] Referring now in particular to Figure ~~4B~~ 4, for molecule 34, initially the I(V) response is in a "1" state (closed circles), that exhibits NDR. Once application of a 1.5 V pulse takes place, the molecule sets into a new state, "0" (open circles). The initial state is restored by application of a negative bias. This is the reverse of the initial/final switching observed for molecule 32, as shown in Figure ~~3A~~ 3. However, each behavior is exemplary of the duality of switch states. An advantage of molecule 34 is that it is a molecule that exhibits negative differential resistance at room temperature. Further, the retention of the switched state was observed for 24 h. It is believed that longer retention times will be possible with improved packaging of the system. It is preferred that a nanocell 12 is hermetically sealed to improve stability of the switched states for longer times.

<remainder of page left intentionally blank>